REMARKS

Overview of the Office Action

The specification has been objected to for various informalities.

Claims 1, 2, 4-6, 8-10, 12-14, and 16 have been rejected under 35 U.S.C. §102(b) as anticipated by U.S. Patent No. 6,429,846 to Rosenberg et al. ("Rosenberg").

Claims 3, 7, 11, and 15 have been objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form.

Claims 1-9 and 15 have been amended.

Claims 2 and 10 have been canceled.

Claims 17 and 18 have been newly added.

Claims 1, 3-9 and 11-18 are now pending.

Objections to the specification

The Office Action states that the Title at the top of the specification is missing the term "multi-functional".

The Title has been amended to include the term "multi-functional".

The Office Action further states that the application section "Cross reference to related applications" must include the status: "now abandoned".

The application section "Cross reference to related applications" has been amended to recite the status: "now abandoned".

Applicants submit that these objections have now been overcome.

Rejection of claims 1, 2, 4-6, 8-10, 12-14, and 16 under 35 U.S.C. § 102(b)

With respect to claim 1, the Office Action states that Rosenberg teaches all of Applicants' recited elements.

Independent claim 1 has been amended to more clearly point out that which Applicants regard as the invention. Specifically, independent claim 1 as amended recites in an electronic device a single component for generating user detectable multi-functional feedback in response to a stimulus signal. The electronic device includes a housing, a display, and electronic circuitry located in the housing. A lens covers the display, and has a transparent area that is placed over the display. Force sensors are attached to the lens for detecting a user's touch against the lens; the force sensors produce a stimulus signal in response to the touch. At least one resonating vibrating element is attached to an area of the lens that extends outside area of the of the display that the transparent portion overlies. The single component comprises the lens and the at least one resonating vibrating element. The at least one resonating vibrating element is operable to produce at least two feedback signals selected from the group consisting of a haptic feedback signal, a vibratory alert signal, an audio signal, and a buzzer signal. An electrical drive circuit is electrically coupled to the at least one resonating vibrating element for electrically driving the at least one resonating vibrating element with a drive signal based on the stimulus signal. Support for the claim amendments can be found at least in paragraph 0032 of the published specification.

Rosenberg discloses a haptic feedback planar touch control that is used to provide input to a computer. A touch input device includes a planar touch surface that inputs a position signal to a processor of the computer based on a location of user contact on the touch surface. The computer can position a cursor in a displayed graphical environment based at least in part on the position signal, or can perform a different function. At least one actuator is also coupled to the

touch input device and outputs a force to provide a haptic sensation to the user when the user's touch contacts the touch surface. The touch input device can be a touch pad separate from the computer's display screen, or can be a touch screen. Output haptic sensations on the touch input device can include pulses, vibrations, and spatial textures. The touch input device can include multiple different regions to control different computer functions.

Rosenberg discloses the use of one or more actuators, such as piezoelectric actuators, which are coupled to a touch pad to produce the heptic sensation. The sensing technology used in the touch pad can be a capacitive or resistive surface (see col. 4, lines 6-42 of Rosenberg). The system taught by Rosenberg may be applied to a flat-panel display of a hand-held device, wherein a transparent sensor film is overlaid on the panel to form a touch screen.

In every disclosed embodiment, Rosenberg teaches that one or more actuators are coupled to the underside of the touch pad (see col. 2, lines 14-15; col. 7, lines 24-26; col. 8, lines 62-67; col. 10, lines 16-20; and col. 11 lines 15-20 of Rosenberg). Thus, when a device using the Rosenberg teachings is assembled, an actuator is first fitted to the underside of the display panel that is then fitted to the housing. Put another way, the actuator is directly coupled to the display panel. Consequently, an essential feature of Rosenberg's feedback assembly is the location of the actuator. In every embodiment disclosed by Rosenberg, the actuator is located in the space between the housing and the display panel. In Rosenberg, this is the only possible location for causing vibration or imparting other physical sensation to the panel.

The feedback assembly disclosed by Rosenberg is capable of producing only simple haptic sensations, such as a pulse, vibration, or spatial texture. The spatial texture is a force similar to a pulse force, but depends on the position of the user's finger on the area of the touch pad (see col. 11, lines 40-44 of Rosenberg). Common to all of the actuators taught by Rosenberg

is that they output a force on the touch input device to provide a haptic sensation to the user who is contacting the touch surface (see col. 2, lines 14-17 of Rosenberg); the haptic sensation is communicated through -- i.e. from the opposite free or surface of -- the display screen. In other words, the user can only feel, at the user's fingertip, a haptic sensation when the user is actually touching the touch surface. And no sound or buzzer signal is heard, in contrast to the recitation of applicants' independent claim 1.

In contrast to Rosenberg, applicants' claim 1 recites a display that may be of any known type. The display is not (or need not be) touch-sensitive, and no transparent sensor film is (or need be) overlaid on the display to form a touch screen. Thus, when the device is assembled, the display is fitted directly into the housing, without interposed actuators as in Rosenberg. Applicants' claims do not recite actuators connected to the underside of the display and, consequently, after installation of the display to the housing, no actuators reside in the space between the display and the housing.

Instead, in applicants' invention, a lens or plate is disposed, e.g. on the housing of the electronic device, so that it covers not only the display but also an area outside or beyond the display. Thus, the area or extent of applicants' lens is larger or greater than the area of the display, and the lens includes a transparent portion that corresponds in size to that of the display. Force sensors are attached to the lens for detecting and recognizing the user's touch against the lens and a touch point on the lens, and for producing a stimulus signal responsive to that touch. The lens further includes at least one vibrating element that is attached to an area of the lens that extends outside of or beyond the transparent area. The lens with the at least one vibrating element attached to it forms a single component. The lens unit is then fitted to the electronic device housing so that the transparent area is positioned directly over the display. The at least

one vibrating element resides between the lens (which is separate from the display) and the housing, not between the housing and the display as taught by Rosenberg. Moreover, the haptic sensation is communicated to the user through the lens, not through the display as in Rosenberg.

In preferred forms of the invention, the resonating vibrating element is implemented by a piezo-bender that is fixed on the lens. When the piezo-bender vibrates, it causes the lens to vibrate as well. Depending on the vibration frequency of the piezo-bender, a user can hear a buzzer sound or an audio sound or a vibratory alert signal, or the user can feel the vibration of the lens when the lens is touched (i.e., a haptic feedback signal), in contrast to the device of Rosenberg.

Applicants' lens will have its own resonance frequency and, when the piezo-bender vibrates at that resonance frequency, it will cause resonance of the lens; the lens will then act as the dome of a loudspeaker. The cover of the electronic device will also have a characteristic resonance frequency and, when the piezo-bender vibrates at that frequency, the cover of the electronic device will resonate. In either case, an audio signal will be heard, in contrast to the device taught by Rosenberg.

It is well known to those skilled in the art that a piezo-bender can produce signals in a frequency range of 200-300 Hz. With such a piezo-bender attached to the lens, when the user touches the lens the vibration of the lens (caused by the piezo-bender) is felt. It is known by those skilled in the art that signals in the frequency range of 500-4000 Hz are audible signals and, accordingly, in order to produce audible signals a piezo-bender that is capable of producing signals (i.e. vibrating) at 500-4000 Hz can be attached to the lens. If the lens has been designed so that its resonance frequency is within this frequency band, then the lens will act as a dome (or cone) of a loudspeaker and strengthen the audio signal.

Col. 15, line 60 to col. 16, line 52 of Rosenberg have been cited as allegedly teaching the at least one resonating vibrating element being operable to produce at least two feedback signals selected from the group consisting of a haptic feedback signal, a vibratory alert signal, an audio signal, and a buzzer signal. Applicants submit that the cited passages have been misinterpreted.

Col. 15, line 60 to col. 16, line 52 of Rosenberg merely describe data entry using a touch screen and haptic feedback signals. Nothing is taught or suggested in that text regarding the provision or use of at least one resonating vibrating element operable to produce at least two feedback signals selected from the group consisting of a haptic feedback signal, a vibratory alert signal, an audio signal, and a buzzer signal, as is recited in applicants' independent claim 1.

In view of all of the foregoing, Applicants submit that Rosenberg fails to teach or suggest the subject matter recited in independent claim 1. Specifically, Rosenberg fails to teach or suggest, in an electronic device, a single component device for generating user detectable multi-functional feedback in response to a stimulus signal, which includes at least one resonating vibrating element that is attached to an area of a lens positioned over and extending outside of the display, the single component including the lens and the at least one resonating vibrating element, with the at least one resonating vibrating element being operable to produce at least two feedback signals selected from the group consisting of a haptic feedback signal, a vibratory alert signal, an audio signal, and a buzzer signal.

Independent claim 9 has been amended to recite limitations corresponding to those discussed above with regard to claim 1 and is therefore deemed to be patentably distinct over Rosenberg for at least the reasons discussed above with respect to claim 1.

Claim 2 has been canceled. Claims 4-6, 8, 10, 12-14 and 16-18, which depend directly or indirectly from independent claims 1 and 9, incorporate all of the limitations of the respective

independent claim and are therefore deemed to be patentably distinct over Rosenberg for at least those reasons discussed above with respect to independent claims 1 and 9.

Conclusion

Based on the foregoing, Applicants submit that the present application is now in full and proper condition for allowance. Prompt and favorable action to that effect, and early passage of the application to issue, are respectfully solicited.

Should the Examiner have any comments, questions, suggestions, or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate an early resolution of any outstanding issues.

Respectfully submitted,

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